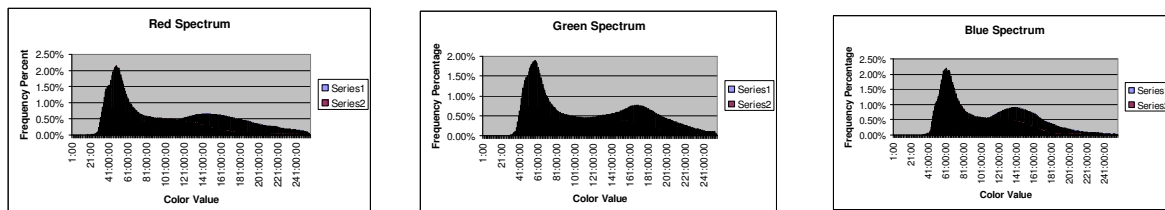


Inventory of California Live Oak in the City of Santa Clarita Using LAR-IAC High Resolution Near Infrared and Color Photography: A Programmed Approach

The City of Santa Clarita contracted with Nag Inc. to utilize LAR-IAC four-inch resolution Near Infrared and Color digital ortho photography to inventory California Live Oak trees within their jurisdiction. This species is protected under the City's Oak Tree Ordinance formulated along the guidelines provided by a similar ordinance of the County of Los Angeles. Development of any property within the City jurisdiction requires mitigation measures to compensate for any oak tree that may be impacted, an expensive operation, since the cost of mitigation for a heritage oak may exceed \$100,000.



A pilot area was defined comprising four tiles in an area with an abundance of oak trees towards the southeastern portion of the jurisdiction for the development of a prototype application.

The pilot area was field surveyed with the assistance of City GIS staff and an Arborist of the Parks and Recreation Department. Oak trees were identified at site and delineated on a printout of a single tile. Back at the ES GIS facility, polygons were created to envelop the corresponding tree canopies observed on the geo-referenced photography.

Engineering Systems developed an application in the Microsoft Visual C++ .NET environment to scan four-inch resolution raster images of near-infrared and color aerial photography that the City licenses from LAR-IAC in native tagged image file format (TIFF). Each tile comprised an 8000 x 8000 4-inch pixel grid comprising 64 million pixels that were analyzed to prepare histograms to represent the





frequency of individual Red, Green and Blue values. Frequencies were independently derived for pixels contained within the boundaries of each polygon representing a known oak tree and separately for pixels outside these polygons. The two histograms were compared to select peak values that would represent the spectral signature of the presence of an oak tree.

A second program rescanned each tile to select pixels with these signature values to as a preliminary means of identification of oak trees. Each identified pixel was represented as a point feature on a graphic overlay of the geo-referenced otho-photo tile. Circles were then drawn to represent each oak tree canopy. The resulting maps were then used for a second field survey to validate the results of the program. It was determined that the program was relatively accurate in identifying mature oak trees, but that younger trees with smaller canopies were not being identified. ES is now in the process of analyzing the signature of these younger trees for inclusion in the model. Three errors were also noted of trees that were not oak trees, requiring a separate analysis to ensure that these signature values were not selected in subsequent processing.

